Third Five-Year Review Report

Lord-Shope Landfill Superfund Site

Girard Township
Erie County, Pennsylvania

Prepared By:
United States Environmental Protection Agency
Region III
Philadelphia, PA

Approved By: **Date:**

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List of Acronyms

ARAR(s)	Applicable or Relevant and Appropriate Requirement(s)
AOC	Administrative Order on Consent
CASRN	Chemical Abstract Service Registry Number
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FR	Federal Register
FS	Feasibility Study
gpm	gallons per minute
HI	Hazard Index
IC	Institutional Control
GPRA	Government Performance and Results Act
GWTS	Groundwater Treatment System
HHRA	Human Health Risk Assessment
ISVS	In-Situ Vapor Stripping
mg/kg	milligrams per kilogram (mg/kg)
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PCOR	Preliminary Close-Out Report
ppb	parts per billion
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization
SDWA	Safe Drinking Water Act
ug/L	micrograms per liter
VC	vinyl Chloride
VOC	Volatile Organic Compound

Executive Summary

The EPA remedy for the Lord-Shope Landfill Site (Site), Girard Township, Erie County, Pennsylvania, set forth in a Record of Decision issued June 29, 1990, focused on preventing direct contact with the landfill wastes and eliminating or reducing the risks posed by potential ingestion of contaminated groundwater. The remedy included the in-situ vapor stripping of the landfill materials and the surrounding contaminated soils to reduce the volume of contaminants present in those media, a groundwater extraction and treatment system, and the construction of security fencing around portions of the Site to limit access and to eliminate the risks posed by direct contact with, or ingestion of, contaminated soils. Institutional controls were required to restrict the use of groundwater in the area occupied by the contamination plume. These measures were taken in addition to the State-mandated remedial actions implemented in 1984 which included a composite cap and revegetation of the landfill to reduce leachate production and the construction of an upgradient groundwater cut-off wall which acts to further reduce leachate production. The Site achieved construction completion status with the signing of the Preliminary Close Out Report (PCOR) on September 30, 1996. The first Five-Year Review for this Site was completed on November 4, 1999, and the second Five Year Review was completed on September 10. 2004. Both previous Five-Year Reviews found the Site remedial action to be protective of public health and welfare and the environment.

The assessment of the Site by this, the third Five-Year Review, found that the remedy as constructed in accordance with the requirements of the Record of Decision (ROD) is functioning as designed. The landfill cap, the security fencing and the institutional controls prevent any direct contact with contaminated soil. The institutional controls placed on the deeds of the properties remain in effect and prevent the use of contaminated groundwater. Also, the extent of the groundwater contamination has been reduced to just north of the Lord-Shope Site property line. Because the remedial action is protective, the Site is protective of human health and the environment.

Government Performance and Results Act (GPRA) Measures Review

As part of this Five Year Review the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

Environmental Indicators Human Health: HEUC = Current Human Exposure Under Control

Groundwater Migration: GMUC = Groundwater Migration Under Control

Sitewide RAU: The Site has achieved Site-Wide Ready for Anticipated Use (SWRAU) on Site was determined Site-Wide Ready for Anticipated Use (SWRAU) on 06/27/2008.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Lord-Shope Landfill		
EPA ID: PAD980508931		
Region: 3	**State:** PA	**City/County:** Girard Township, Erie County
SITE STATUS		
NPL status: X Final ☐ Deleted ☐ Other (specify)_____		
Remediation Status (choose all that apply): ☐ Under Construction X Operating ☐ Complete		
Multiple OUs?* ☐ YES X NO	**Construction completion date:** September 30, 1996	
Has site been put into reuse? ☐ YES X NO ☐ NA		
REVIEW STATUS		
Lead agency: X EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: David P. Turner		
Author title: Remedial Project Manager	**Author Affiliation:** U.S. EPA - Region 3	
Review period:** September, 2008 - July, 2009		
Date(s) of site inspection: 10/08/2008		
Type of review: X Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) X 3 (third) ☐ Other(specify)_____		
Triggering action: ☐ Actual RA Onsite Construction ☐ Actual RA Start at OU# _____ ☐ Construction Completion X Previous Five-Year Review Report ☐ Other (specify) Informed public review would be conducted		
Triggering action date: September 10, 2004		
Due date (five years after triggering action date): September 10, 2009		

* ("OU" refers to operable unit.)
**(Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.)

Five-Year Review Summary Form, cont'd

Issues:
There are no outstanding issues or concerns related to the Lord-Shope Landfill Site (Site).

Recommendations:
There are no recommendations for follow-up actions at the Site.

Protectiveness Statement(s):
The remedy is protective of human health and the environment. The constructed remedy is functioning as intended by the ROD. The landfill cap, the security fencing and the institutional controls prevent any potential for direct contact with contaminated soil. The institutional controls are in place and are being maintained on the deeds to the properties and, in conjunction with other protective measures at the Site, serve to prevent use of, and direct contact with, the contaminated groundwater. The treated groundwater effluent discharged to the unnamed tributary of Elk Creek is in compliance with NPDES standards. The remedy remains protective of human health and the environment.

The long-term protectiveness of the remedy will continue to be verified by inspecting the Site to assess the condition of the landfill cap and the fencing, by monitoring the efficiencies of the groundwater extraction and treatment system and the soil vapor extraction and treatment system, by the periodic sampling and analysis of groundwater from monitoring wells and residential wells, and by verification that the required institutional controls continue to remain in place.

Other Comments:
None.

Lord-Shope Landfill Superfund Site
Girard Township, Erie County, Pennsylvania
Third Five-Year Review Report
EPA ID No. PAD980508931

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA) Region III, conducted the five-year review of the remedy implemented at the Lord-Shope Landfill Superfund Site (Site) in Girard Township, Pennsylvania. This review was conducted by the Remedial Project Manager (RPM) for the entire site from October 2008 through May 2009. This report documents the results of the review.

This is the third five year review for the Lord-Shope Landfill Site. The triggering action for this statutory review is the previous Five Year Review dated September 10, 2004. The Five Year Review is required due to the fact that hazardous substances,

pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 contains a chronology of events for the Lord-Shope Landfill Superfund Site.

Table 1: Chronology of Site Events

Date	Activity
Mid 1950s thru 1979	Industrial wastes including: spent adhesives, degreasing solvents, cutting oils, acids and caustics; along with paper, wood and rubber wastes, were disposed of at the Site.
July 1982	Lord Corporation and the property owner entered into a Consent Order and Agreement with the Pennsylvania Department of Environmental Resources (PADER), now the Pennsylvania Department of Environmental Protection (PADEP), for the implementation of "remedial measures" and for continued monitoring at the Site.
December 30, 1982	The Site is proposed for inclusion in the National Priorities List (NPL) *58476 - 58485 Federal Register / Vol. 47, No. 251.*
1982-1983	Lord Corporation implemented the remedial measures contained in the PADER Consent Order and Agreement. This included the removal of 81 drums of waste, the construction of a composite cap over the landfill, and a low-permeability subsurface groundwater cut-off wall and installation of a groundwater monitoring system.
September 8, 1983	The Site finalized on the NPL *40658 - 40673 Federal Register / Vol. 48, No. 175.*
November 12, 1987	A Consent Order is signed by Lord Corporation and PADER in which Lord Corp. agreed to conduct a Remedial Investigation and Feasibility Study (RI/FS).
March 26, 1990	The RI/FS and Proposed Plan identifying EPA's preferred remedy was presented to the public, starting the period for public comment.
June 29, 1990	Record of Decision (ROD) issued requiring: 1) groundwater extraction and treatment, 2) in situ vapor stripping, 3) security fence and institutional controls.
September 27, 1991	Consent Decree (CD), Civil Action No. 91-177(E), involving EPA and Lord Corporation for the performance of a remedial design and a remedial action (RD/RA) is entered in U.S. District Court for the Western District of Pennsylvania.
July 20, 1994	EPA approved the Remedial Design (RD).
October 31 ,1994	Onsite construction of the remedial action began.
September 30, 1996	A Preliminary Close-Out Report (PCOR) EPA Region III, designating the remedial action construction complete.

November 4, 1999	The first Five-Year Review Report completed.
September 2000	EPA Region III Environmental Science Center (ESC) performs audit of Lord Corp laboratory and environmental analysis.
2001	EPA Region III Environmental Science Center (ESC) issues report recommending the elimination of some anayltes from groundwater monitoring program.
2001	EPA approved a reduction in frequency of groundwater sampling for monitoring wells to once a year, a reduction in the number of wells being sampled and a modification of the bio parameter list.
August 2002	EPA approved a reduction in the monitoring frequency of Site groundwater well hydraulic conditions from 4 times/year to 2 times/year and the inclusion of three additional monitoring well clusters in the monitoring program.
September 10, 2004	The Second Five-Year Review Report completed.
Fall 2007	Thermal oxidizer taken off-line due to mechanical failure.
Spring 2008	Replacement thermal oxidizer brought on-line.
October 2008	Third Five-Year Review begins.
February 2009	EPA approves modification to residential well monitoring program

III. Background

Physical Characteristics

The 25.2 acre Lord-Shope Landfill Superfund Site (Site) is located a few hundred feet west of 6262 Pieper Road and approximately 4,500 feet south of the intersection of U.S. Route 20 and Pieper Road in Girard Township, Erie County, Pennsylvania. The site consists of an inactive, hazardous waste landfill covering approximately 4 acres, and adjacent areas of contaminated soil, surface water, and groundwater and treatment building housing the treatment equipment necessary for remedial action. The landfill currently appears as a grassy mound rising twenty feet above the surrounding land, the treatment building is a one story structure with an area of approximately 5000 square feet. To the north of the Site and to the west of the Site are two unnamed tributaries of Elk Creek. The property is currently owned by the Lord Corporation (Lord) whose corporate offices are located in Cary, North Carolina.

Land and Resource Use

The area surrounding the site is primarily rural agricultural with scattered residential areas bordering the roads. The Site property is bounded by residential properties to the east, an apple orchard and vineyard to the south, an evergreen nursery to the west, and a crop field and the Overlake golf course to the north. The only nearby residences are located along Pieper Road to the east, approximately 1,000 feet from the landfill, and to the north, along Route 20 (West Ridge Road) which, at its nearest point, is approximately 3,500 feet from the landfill. All residences in the area utilize groundwater as their potable water source. A map showing the location of the Site is included as

Figure 1. The nearest population center, Girard Borough, is located two miles to the northeast of the site. Girard Borough population at the 2000 census was 3,146 people.

History of Contamination

From the mid-1950s until 1979, industrial wastes; including spent adhesives, degreasing solvents, cutting oils, acids and caustics; along with miscellaneous paper, wood and rubber wastes, were disposed of at the Site. The property was owned and operated by Mr. Melvin Shope who was then an employee of Lord. The wastes were generated at the Lord Corporation's manufacturing plants located in Erie and Saegertown, Pennsylvania, and transported to the Shope property for disposal.

Initial Response Activities

In 1982, after Lord had conducted some preliminary site studies, Lord, Mr. Shope, and the Pennsylvania Department of Environmental Protection (PADEP), then named the Pennsylvania Department of Environmental Resources (PADER), entered into a Consent Order and Agreement (COA) that required the continued monitoring and the implementation of remedial measures at the Site. This was implemented in 1982 and 1983 and consisted of the removal and proper disposal of approximately eighty one (81) exposed drums of waste, emplacement of a composite cap over the landfill, the construction of a low permeability groundwater cutoff wall upgradient (south) of the landfill, and the regrading and revegetation of the Site. The construction of the cap included a clay layer, a synthetic membrane, and a grass vegetation soil cover. The objective of the cap and cut-off wall was to reduce the amount of contamination entering the groundwater by reducing leachate production in the landfill and diverting groundwater flow around the Site. The site was proposed for inclusion on the National Priorities List (NPL) on December 30, 1982, and was finalized on the NPL on September 8, 1983.

In order to supplement the existing site information and to meet the requirements of CERCLA, the PADER and the EPA requested, in 1985, Lord to conduct a focused Remedial Investigation and Feasibility Study (RI/FS). In 1987, Lord agreed to conduct the RI/FS under the terms of a Consent Order signed by PADER and Lord. The RI was conducted and submitted by Lord's environmental consultant, Aware Incorporated. Following the evaluation of the report, PADER and EPA decided further investigations at the Site were necessary, and requested Lord to conduct a "Phase II" RI and FS. The subsequent RI/FS Report was submitted as a comprehensive report covering all of the Site characterization work done up to that point. The investigations identified the contaminated or potentially contaminated media to be the landfill materials, groundwater, subsurface soils, and, to a limited extent, surficial soils.

The report showed that as a result of the uncontrolled disposal of liquid wastes and the leaching of contaminants, site soils, landfill materials, and groundwater became contaminated with volatile organic compounds (VOCs) and various heavy metals. The contaminant plume extends off the Site property boundary onto an adjacent golf course. Site related contaminants consist of the following: acetone, arsenic, barium, benzene, 1,2-trans-dichloroethene, lead, methyl ethyl ketone, methyl isobutyl ketone,

tetrachloroethene, trichloroethene, and vinyl chloride. Long-term risks are posed by the potential consumption of contaminated groundwater. Residences adjacent to the Site, rely on groundwater for their drinking water supplies. Historic and ongoing monitoring of these wells indicates they have not been impacted by Site related contaminants.

On March 26, 1990, the Remedial Investigation / Feasibility Study (RI/FS) and the Proposed Plan identifying EPA's preferred remedy were made available to the public, starting the public comment period that ended on April 25, 1990.

Summary of Basis for Taking Action

Hazardous substances that were found at the Site during the investigations include:

Table 2: Hazardous Substances by Media found at Site during the RI

(For Complete Results reference the Phase II RI)

Chemical	CASRN	Soil	Groundwater	Sediment	Seeps
Tetrachloroethene (PCE)	127-18-4	X	X		
Toluene	108-88-3	X			
Ethyl Benzene	100-41-4	X			
Benzene	71-43-2	X	X		
Methylene Chloride	75-09-2	X			
Trichloroethene (TCE)	79-01-6	X	X		X
Methyl Isobutyl Ketone (MIBK)	108-10-1		X		
4-Methyl-2-Pentanol	108-11-2	X	X		
Acetone	67-64-1	X	X	X	
Methyl Ethyl Ketone (MEK)	78-93-3	X	X		
Vinyl Chloride	75-01-4	X	X		
trans-1;2-Dichloroethene	156-60-5		X		
Cyclohexanone	108-94-1		X		
2-Butanol	78-92-2	X	X		
Isopropanol	67-63-0		X		
Tetrahydrofuran (THF)	109-99-9		X		
Chlorobenzene	108-90-7		X	X	
1,1-Dichloroethene	75-34-3		X		
Aluminum	7429-90-5		X	X	X
Arsenic	7440-38-2		X	X	X
Barium	7440-39-3		X	X	X
Cadmium	7440-43-9		X	X	
Chromium	N/A		X	X	X
Cobalt	16610-75-6		X	X	
Copper	7440-50-8		X	X	X
Lead	7439-92-1		X	X	X
Mercury	7439-97-6		X	X	X
Nickel	8049-31-8		X	X	
Zinc	7440-66-6		X	X	X

N/A= Not Available, X=found in medium, X= found in medium

Human Health Risk Assessment (HHRA)

The original baseline public health evaluation which was provided to the PADER in 1987 focused primarily on the risks to humans associated with potential ingestion of contaminated groundwater in the vicinity of the Site. Subsequent to the review of the

report, the PADER requested that the public health evaluation be reevaluated in light of the new data which would be collected during the Phase II RI, and furthermore, that additional pathways be incorporated into the risk estimation process. It was agreed that this would be done and additional data were collected so that other potential pathways, for example, ingestion of contaminated sediments, inhalation of volatile organics present in surface water seeps, and ingestion of contaminated surface waters, could be evaluated. The risks associated with potential groundwater ingestion were quantified using both an "upper bound" and a "best" estimation approach.

Potential exposures to groundwater at the Site were found to be associated with significant human health risks in that these risks exceeded EPA's risk management criteria for either the average or the reasonable maximum exposure scenarios. The carcinogenic risks and the non-carcinogenic risks were highest for the ingestion of the groundwater. Risks related to the possible ingestion of soils and sediments at the Site were within acceptable ranges. It was determined that while the ingestion of water from contaminated surface seeps at the Site present an unacceptable risk, it would be highly unlikely that accidental ingestion of the seep water would occur.

The risk assessment concluded that risks related to the potential ingestion of surface water from the two small unnamed tributaries that flow north of the landfill, and from the ingestion of the sediments of those tributaries were determined during the remedial investigation to be within EPA's acceptable range. It was also found that risks posed by inhalation of contaminants in the air at the Site were insignificant because of the very low concentrations of those contaminants and because of the low likelihood of any significant time of exposure.

Table 3: Estimated Carcinogenic and Non-Carcinogenic Risks at Lord-Shope Site

Media and (Pathway)	Carcinogenic Risk	Non-Carcinogenic Risk Hazard Index (HI)
Groundwater (Ingestion)	1.0 E-01	2.8 E+01
Surface Water from Seep (Ingestion)	1.7 E-04	1.2 E-02
Soil or Sediments Combination (Ingestion by a Child)	4.4 E-06	8.7E-04
Air (Inhalation of Volatiles from Seep)	2 E-06	(N/A)

*Summary of results from the Site ROD and Revised Baseline Public Health Evaluation Report, August 1989.

CERCLA defines acceptable carcinogenic risk ranges as the risk of one additional cancer in 10,000 to one additional cancer in 1,000,000 (or in scientific notation 1 E-04 to 1 E-06) and non-carcinogenic risk of an HI less than 1.0. The risk assessment is used to quantify threats posed by a hazardous substance to human health and the environment.

The results of the risk assessment are used to establish the basis for taking a remedial action and aid in the development of cleanup alternatives during the Feasibility Study.

IV. Remedial Actions

On June 29, 1990 the EPA Regional Administrator signed a Record of Decision (ROD) setting forth EPA's Selected Remedial Alternative. The remedial action objectives stated in the ROD are to eliminate or reduce the risks posed by the potential ingestion of contaminated groundwater and direct contact with the contaminated soils associated with the Site. The ROD contains the following major remedy components:

1. Groundwater extraction and treatment to halt contaminant migration in groundwater, with the long-term effect of returning the groundwater to its most beneficial use. The most beneficial use of groundwater at the site is drinking water. The treated groundwater is discharged to a tributary of Elk Creek adjacent to the site, subject to National Pollution Discharge Elimination System (NPDES) permit regulations;

2. In-situ vapor stripping (ISVS) that uses vacuum wells to remove volatile organic compounds from the landfill materials and surrounding soils; and

3. The additional protection provided by institutional controls to restrict the use of contaminated groundwater and the installation of security fencing around the property to prevent direct human contact with contaminants at the Site.

Remedy Implementation

On June 25, 1991, Lord entered into a Consent Decree with the United States for the design and implementation of the remedy selected in the ROD. On July 20, 1994, EPA approved the Site's Remedial Design.

The Remedial Action construction at the Site began on October 31, 1994, and all physical construction of the remedy in accordance with the approved remedial plans and design specifications was completed on June 5, 1996. The Site's Preliminary Close-Out Report (PCOR) was signed on September 30, 1996. The Site is presently in the Operation and Maintenance (O&M) phase of activities.

Cleanup Goals

The cleanup goals for the groundwater were developed using existing or proposed Maximum Contaminant Levels (MCLs). The cleanup goal identified in the ROD is the Commonwealth of Pennsylvania requirement pertaining to groundwater containing hazardous substances. It requires that all groundwater must be remediated to "background" quality. To the extent that the concentration of any contaminant exceeds the background concentration, the cleanup level will be modified to or set at the background concentration unless attainment of background concentration is determined

to be infeasible or is otherwise waived under Section 121(d)(4) of CERCLA, 42 U.S.C. Section 9621(d)(4). Such a waiver, or a change from the "background" standard, requires an EPA approved TI-waiver evaluation and a modification to the ROD incorporating the waiver. [From the time of the issuance of the ROD, the Commonwealth of Pennsylvania has promulgated a statute, the Land Recycling and Environmental Remediation Standards Act ("Act 2") of 1995 which does not necessarily require that contaminated groundwater be cleaned up to background standards. However, the ROD has not been modified to permit any standard lesser than "cleanup to background" for groundwater.]

The groundwater remediation at the site via extraction and treatment is classified as a PRP-LR long term response action (PRP-LR). A PRP-LR is the equivalent of LTRA, except that LTRA is conducted by EPA. During the PRP-LR, performance data is collected and evaluated in accordance with the remedy's long term groundwater monitoring plan. If this performance data indicates that background levels are technically impracticable to achieve, the background standard will be waived through a ROD modification. In accordance with the approved Long-term Groundwater Monitoring Plan, Lord performs groundwater monitoring of on-site, off-site perimeter and residential wells adjacent to the site. Lord also performs sampling and analysis of the NPDES outfall on a quarterly basis. Historic analytic results indicate the NPDES outfall limits are in compliance and site related groundwater contamination has not impacted residential wells.

Lord mobilized at the site on October 31, 1994 to begin construction of the remedy with the installation of the discharge line for the groundwater treatment system (GWTS). This portion of the construction was completed in late November 1994 and work at the site ceased until the spring 1995. Work on the in-situ soil vapor stripping (ISVS) system, the GWTS, and the construction of the groundwater treatment building began in the spring of 1995 and continued throughout the fall of 1995. The ISVS system consists of a vapor extraction system, vapor collection header system, vapor treatment system (thermal oxidizer), monitoring components and controls. The ISVS system, and the groundwater treatment building were completed in the Fall of 1995. The ISVS became operational in November 1995. The groundwater recovery GWR system includes two groundwater recovery wells, an underground force main, controls, and associated electrical equipment, the aboveground piping is constructed of steel and is heat traced and insulated. The GWR wells are connected to the below ground header system that conveys recovered groundwater under pressure to the groundwater treatment system (GWTS). In December of 1995, a pump test was performed on three groundwater recovery wells and the GWTS was tested. Based on the results of this pump test, the final design for the GWR system was completed in February 1996. The GWR system equipment was installed in May 1996, and became operational on June 5, 1996. The groundwater treatment system provides metals removal through solids separation and volatile organics removal by air stripping.

Lord Corporation completed the construction of the remedy on June 5, 1996. The construction activities took place in a manner consistent with the ROD, the approved

Remedial Design and Remedial Action (RD/RA) Work Plan. The Remedial Design Reports, including Quality Assurance Project Plans, incorporated all EPA and State quality assurance and quality control procedures and protocols. Lord implemented the construction and quality control plans in accordance with the Remedial Design specifications. On August 8, 1996 the pre-certification inspection was conducted and no remedial action construction deficiencies were noted by EPA, EPA's oversight contractor (Halliburton NUS), or PADEP. The required institutional controls, including deed restrictions, and the Site fencing were implemented by Lord Corporation in 1991 shortly after the lodging of the Consent Decree.

System Operation and Maintenance (O&M)

All Operation and Maintenance (O&M) costs are paid for by Lord Corporation. The 1990 ROD estimated average annual operation and monitoring costs for the remedy would be $310,000 for a standardized duration of 30 years.

O&M costs at the Site include expenses related to maintenance of the landfill cap and fencing, the operation of the vapor stripping system and the thermal oxidation system, the pumping and treatment of contaminated groundwater, the discharge of treated groundwater, and monitoring of the various Site wells and the residential wells. On June 26, 2009 via e-mail to EPA, Lord Corporation indicated the Site's current average O&M expenses for the past five years to be approximately $351,000 a year. This averaged cost also includes the replacement cost of the thermal oxidizer unit.

The actual (five year averaged) O&M costs are currently running 13.23% greater than the estimated annual O&M cost presented in the ROD.

O&M activities at the Site are performed according to the approved "Operation and Maintenance Manual for the ISVS and GWTS", dated August 1996. The primary activities associated with O&M are summarized in Table 4.

Table 4. Summary of O&M Activities for the Lord-Shope Landfill Site

O&M Activities Performed
• Monitoring GWTS discharge to the unnamed tributary of Elk Creek to assure that NPDES standards are not being exceeded;
• Maintaining the grass cover and the cap of the landfill;
• Maintaining the security fence surrounding the landfill and treatment building;
• Assuring that the GWR system is functioning properly;
• Assuring that the GWTS is operating as designed;

- Assuring that the ISVS system is functioning as designed;

- Operating and maintaining the thermal oxidizer unit;

- Inspecting the condition of the groundwater monitoring wells;

- Sampling bi-annually residential wells for Site-related contaminants;

- Measuring, on a semi-annual basis, water levels in the Site's groundwater monitoring wells;

- Performing annual sampling of the Site's groundwater monitoring wells for Site-related contaminants; and

- The reporting of Site conditions including groundwater sample analysis results, NPDES discharge sample analyses, and the operating efficiencies of the GWTS and the ISVS systems to EPA and PADEP.

V. Progress Since the Last Five-Year Review

The second Five-Year Review for the Site was completed on September 10, 2004 ("2004 Five-Year Review"). The 2004 Five-Year Review protectiveness evaluation concluded that the remedy was protective of human health and the environment. No issues or recommendations were identified during the previous review.

Groundwater

Groundwater monitoring since the 2004 Five-Year Review has shown groundwater contaminant concentrations to be generally in decreasing in concentration over the Site. In the year 1989, the area of groundwater contamination was known to extend approximately 1400 feet north (down gradient) of the landfill. The remedial measures implemented at the Site have resulted in the northern limit of the contaminated area retreating to approximately a few hundred feet north of the landfill by 2008 (in the vicinity of off-site monitoring well W-33).

Currently all VOCs in groundwater from W-33 are below the reporting limit except for vinyl chloride. In the September 2008 sampling round vinyl chloride was detected in W-33 at a concentration of 1.1 ppb. In the previous sampling rounds from June 2004 through September 2008 vinyl chloride concentration in W-33 has consistently been detected below its MCL concentration of 2 ppb, yet above the background concentration. Due to this low concentration of VC in W-33, Lord requested abandoning W-33. EPA declined the request due to the presence of VC in the well, and W-33 being the only off-Site downgradient monitoring location.

Similarly, concentrations of contaminants near the current northern limits of the contaminated area have generally shown declines. For example, the concentration of methyl iso-butyl ketone (MIBK) in monitoring well W-43B, which is located in the intermediate groundwater zone just inside the northern boundary of the Lord-Shope property, has steadily declined. In June 1999, the MIBK concentration in that well was 3,500 ug/L. By November 2002, the concentration had dropped to approximately 49 ug/L, and by September 2008, MIBK concentration was below reporting limits. Also in that well, vinyl chloride concentrations declined from approximately 920 ug/L in April 1998 to approximately 0.71 ug/L in September 2008. All VOCs detected in well W-43B are below their respective MCL.

Monitoring well W-9WT, located in the water table zone and much closer to the landfill than W-43B, had a marked decrease in VC contaminant concentrations from November 2002 when it was detected at a concentration of 16.7 ug/L. In the 2006, 2007 and 2008 sampling rounds VC has consistently been detected at concentrations less than 1 ug/L. TCE concentrations in well W-9WT have also decreased during the same time period from 44.6ug/L to less than 1 ug/L. Both cis-1,2-DCE and trans-1,2-DCE concentrations in W-9WT have had similar decreases over the same time period. The September 2008 sampling indicated cis-1,2-DCE concentration to be 2.9 ug/L while trans-1,2-DCE concentration to be less than 1 ug/L. All VOCs detected in well W-9WT are below their respective MCL.

The GWR system extracts groundwater from two recovery wells drilled into the Intermediate water-bearing zone and located immediately downgradient of the landfill. The GWR system extracted an average of 10,892 gallons per day during 2008 with a total of eighty four (84) days of downtime. The extracted water is sent to the GWTS for contaminant removal and the treated water is discharged onsite to an unnamed tributary of Elk Creek which then flows into Lake Erie. The GWTS reduction of total volatile organic compounds (VOCs) since the last five-year review in 2004, as calculated on a monthly basis, has been often at or near the 100% reduction level. Lord performs sampling and analysis of the Pollution Discharge Elimination System (NPDES) regulated outfall on a quarterly basis. The discharge to the unnamed tributary has consistently met the NPDES standards set for the Site.

In accordance with the approved Long-Term Groundwater Monitoring Plan, Lord performs groundwater monitoring of on-site wells, an off-site well (W-33) and residential wells. Historic analytic results indicate the NPDES outfall limits are in compliance and the site related groundwater contamination has not impacted residential wells.

Thermal Oxidizer

The thermal oxidizer treats the gases extracted from the landfill by the ISVS system, typically operates at an efficiency equal to or exceeding, 99 percent. Only trace amounts of VOCs emitted into the atmosphere. Performance monitoring and sampling data has indicated the total amount of VOCs entering the ISVS has decreased over time, (reference monthly RA progress reports).

The thermal oxidizer unit was taken offline May 09, 2007. The unit had failed and became unsafe to operate. A new thermal oxidizer (Model DTO 250 L&E America, Tann Coporation) was installed in March and April 2008, and went online in late April 2008.

Up until the mechanical failure in 2007 and replacement of the previous thermal oxidizer in 2008, monitoring data indicated that it was consistently operating greater than 99% efficiency.

The total amount of VOCs that are being produced by the landfill continues to decline. In the spring of 2008, in order to optimize the ISVS system Lord Corporation with EPA concurrence, modified the operational period of the ISVS system to allow the landfill gas a recovery time before extraction and destruction. The ISVS extraction wells are cycled on/off at various times during the year. The yearly operation schedule of the ISVS system is adjusted based on current and historic seasonal variation of landfill gas production. Table 5 lists the ISVS compounds of interest at the Site.

Table 5: ISVS Compounds of Interest at the Site

Chloromethane	trans-1,2-dichloroethylene	Tetrahydrofuran	Tetrachloroethene
Vinyl Chloride	1,1-dichloroethane	Benzene	Chlorobenzene
Acetone	2-butanone (MEK)	Trichloroethene	1,3-dimethylbenzene
2-Propanol	Cis-1,2-dichloroethylene	Chloroform	1,2-dimethylbenzene
Methylene Chloride	4-methyl-2-pentanone (MIBK)	toluene	1,1,2,2-tetrachloroethane

VI. Five-Year Review Process

Administrative Components

EPA notified Lord Corporation and PADEP of the initiation of the Five-Year Review September 2008. The Lord-Shope Landfill Site Five-Year Review team was led by David Turner, EPA Remedial Project Manager (RPM) for the Site, and included Ruth Wuenschel, EPA Community Involvement Coordinator (CIC), and members from the Regional Technical Advisory staff with expertise in the application of applicable or relevant and appropriate requirements (ARARs), hydrology, air quality management and risk assessment. Mr. John Morettini, Project Manager at the Pennsylvania Department of Environmental Protection, assisted in the review as the representative of the support agency.

The approach used for this third Five-Year Review included:

• Community Involvement - Notifying the community via newspaper advertisement that EPA is conducting a Five-Year Review at the Site and providing information on whom to contact and how to get more information about the process, conducting community interviews to solicit issues and/or concerns and to continue public education efforts, and notifying the community of how to obtain a copy of the third Five-Year Review Report upon its completion;

• Document and Data Review - Reviewing significant Site specific documents and current and historic environmental monitoring data. Researching ARARs cited in the ROD for revisions as well as investigating potentially new ARARs which may be of significance, checking available published toxicity references for Site-related contaminants to determine if there have been changes since the Site-specific risk assessment which may be relevant to the evaluation of remedy protectiveness;

• Site Inspection - Visiting and inspecting the Site to visually confirm and document the conditions of the remedy, the Site, and the surrounding area. Conducting a check to confirm that the institutional controls are in place; and

• Conducting the Five-Year Review Report -Development and Review.
The Five-Year Review schedule extended from October 09, 2008 to July 03, 2009.

EPA will continue to perform five-year reviews because the remedy implemented relies on the combination of containment and institutional controls to prevent exposure to contaminated soils and groundwater that remain on-Site and which have contaminant concentrations which do not permit unrestricted use. The Site hazards are limited and well defined. Both the hazard source and the containment and treatment technologies utilized at the Site are well understood by EPA.

B. Site Inspection

On October 09, 2008, an inspection of the Site was conducted. The purpose was to observe the Site conditions by making a visual inspection of the various components of the long-term response action, including the Site's operational log books, as well as discussing the components of the remedial action with Lord Corporation representatives. Persons present for the Site inspection included: Mr. George M. Kickel, Manager of Environmental Services for Lord Corporation; Mr. Robert E. Nipper, Staff Environmental Engineer for Lord Corporation; D. Jason Manzo, Arcadis, US; Mr. John Morettini, and Kevin Jordan for PADEP Environmental Protection, and Mr. David P. Turner, Remedial Project Manager for EPA.

Table 6: Personnel Present at the Third Five Year Review Site Inspection

Organization	Personnel
US EPA Region III	David Turner, Remedial Project Manager
PADEP, Northwest Region	John Morettini, Project Manager
PADEP, Northwest Region	Kevin Jordan, Environmental Protection Specialist
Lord Corporation	George Kickel, Manager, Safety and Industrial Hygiene
Lord Corporation	Robert Nipper,
Arcadis U.S., Inc.	D. Jason Manzo, Staff Scientist

The team inspected the treatment plant log books and found them to be up-to-date and in good order. The team then toured the groundwater treatment plant and also

observed the newly installed thermal oxidizer unit. These were in good operating condition. The inspection team walked across the landfill and observed that the landfill cover is in good repair and is well vegetated, and that the property is completely fenced with chain-link fencing in good repair. The team walked to the NPDES discharge location on the unnamed tributary of Elk Creek. The entire facility is functioning as designed and is being operated conscientiously by Lord Corporation.

C. Document Review

The Five-Year review consisted of a review of relevant documents at the EPA Region III offices. Table 7 contains a listing of the key Site documents reviewed during the Five-Year Review.

Table 7: Documents Reviewed for the third Five-Year Review

Document
• Remedial Investigation Phase II / Feasibility Study (RI /FS) Report; • Revised Baseline Public Health Evaluation 1989; • US EPA Record of Decision (ROD), June 29, 1990; • United States of America, Plaintiff v. Lord Corporation, Defendant, Civil Action No. 91-177E (Consent Decree), September 1991; • Remedial Action Construction Documentation Report, Volumes I and II, September 1996; • Preliminary Close-Out Report (PCOR) September 30, 1996 – USEPA; • First Five-Year Review, November 4, 1999 – USEPA; • Second Five-Year Review, September 9, 2004 – USEPA; • 2004, 2005, 2006, 2007 and 2008 Annual Groundwater Monitoring Reports,- Arcadis US; • Monthly Remedial Action Progress Reports – Lord Corp; • Residential Well Sampling Results – Lord Corp.; • NPDES Reports – Lord Corp; and • Deed Restrictions (filed 1991).

D. Data Review

Surface Water and Sediment: The environmental sampling, during the remedial investigation, of the surface water and sediments of the two small tributaries of Elk Creek provided information leading to a determination that the risks posed by those media were within EPA's acceptable range. Also, during the RI, it was determined that the small seeps found in the Site area were unlikely to provide a pathway for significant exposures. While surface water and sediment samples have not been collected as part of a post ROD monitoring program to ensure that these media are not impacted, the groundwater data to date does not suggest that there is a continuing release of groundwater or contaminants in groundwater which would currently pose an unacceptable ecological risk to aquatic receptors associated with the Unnamed Tributary or Elk Creek.

Site-Related Groundwater Wells: Groundwater at the Lord-Shope Landfill Site flows generally to the north. There are currently 17 wells used specifically and exclusively for the monitoring of groundwater quality and biogeochemical parameters. Eight of the wells are bored into the upper or water table zone and range in depth from 13.5 feet to 25 feet. Nine of the wells are bored into the intermediate zone (the water-bearing zone immediately below the water table zone) and range in depth from 28 to 55 feet. (No Site-related contamination has been detected in water-bearing zones below the intermediate zone). Two additional wells, identified as IPE-1 and IPE-2, are located along the northern boundary of the landfill and are used as the extraction wells for the groundwater treatment system. The well monitoring network is shown on Figure 2.

In 1989, volatile organic compounds (VOCs) were detected in wells W-20B, W-33, W-36A and W-39A, all of which are (or were) located north of the Lord-Shope Site property. At that time, the area of Site-related groundwater contamination extended more than 1400 feet north of the landfill. Since 1989, as a result of the pumping and treatment of the groundwater, only one of the four wells, well W-33, has shown VOC contamination, and only for vinyl chloride. Groundwater contamination, in a northerly direction, has decreased approximately by 900 feet since 1989. Even at the location of W-33, the incidence of contamination is restricted to low concentrations of vinyl chloride, and is detected only sporadically. The groundwater wells more immediately north of the landfill continue to show significant Site-related contaminant concentrations. However, the majority of this contamination is limited to the property owned by Lord Corporation and is being controlled by the groundwater pumping and treatment systems.

In 2001, based upon favorable reviews of the groundwater analytical results, EPA approved a reduction in the frequency of the sampling of the Site's monitoring wells from semiannual to annual sampling, therefore, all of the monitoring wells are currently sampled once per year for Site-related contaminants. Also, in August 2002, based upon Lord Corporation's "2001 Hydraulic Monitoring Report...," EPA approved a reduction in the monitoring of the Site-related wells for hydraulic conditions from quarterly to semi-annually. In February, 2009 EPA approved the reduction in frequency of sampling of the thirteen (13) residential wells from semiannual to annual sampling along with the reduction of some of the non-site related analytes. Chemical analyses of the water from these wells have consistently shown no impact from Site-related contaminants.

Groundwater data from the Site reviewed during this Five-Year Review period indicated that there are no human exposures to Site related contaminants of concern in

groundwater at or surrounding the landfill. The data revealed that the groundwater is elevated above the Safe Drinking Water Act's Maximum Contaminant Level (MCL), on the landfill and immediately adjacent to the property in monitoring Well W-33.

ISVS System

The operational data of the ISVS thermal oxidizer was reviewed by an EPA, Region 3, air quality specialist for the possible formation of dioxins and their discharge through the unit's effluent. It was determined that the unit is unlikely to discharge dioxins as part of the effluent primarily because the unit operates at temperatures of 1500 to 1700 degrees F. Dioxins are mainly formed at the temperature range of 400 to 1000 degrees F. Furthermore, the thermal oxidizer produces negligible amounts of fly-ash. Fly-ash is a catalyst for dioxin production and the absence of fly-ash reduces the potential for dioxin formation to a minimum.

In 2008, Lord Corporation finished the replacement of the thermal oxidizer unit and moved to a pulsed operation cycle to optimize recovery and destruction of the VOC gas from the Site. In September 2008, Lord Corp. furnished calculations indicating that the optimized remedy has reduced the usage of natural gas and fossil fuel based electricity, resulting in a reduction of approximately 148.8 tons of Carbon Dioxide.

E. ARAR Review

The applicable or relevant and appropriate requirements (ARARs) identified in Section XI (Statutory Determinations) of the ROD were reviewed and subsequently researched to determine if any significant changes to those ARARs had occurred.

This section considers potential impacts of any new or changed ARARs on the potential risks posed to human health or the environment. This analysis determined that recalculations of risk or a risk assessment to determine whether the remedy continues to protect human health and the environment are not necessary for the Lord-Shope Landfill Superfund Site.

The following are listed as ARARs in the June 29,1990 Record of Decision:

1. Chemical-Specific ARARs:
a. Relevant and appropriate maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act, 42 U.S.C. § 300f to 300J-26, and set forth at 40 C.F.R. §§ 141.1 l(b) and 141.61 (a) and proposed MCLs set forth in 54 Fed Reg. 22062 (May 22, 1989) are contained in Table 8.

Table 8: The MCLs listed in ROD

Contaminant	CASRN	MCL or [Proposed MCL] At ROD issuance (ug/L)
Benzene	71-43-2	5
Chlorobenzene	108-90-7	[100]
Tetrachloroethene	127-18-4	[5]
Toluene	108-88-3	[2000]
Trans-1,2, dichloroethylene	156-60-5	[100]
Trichloroethene	79-01-6	5
Vinyl Chloride	75-01-4	2
Arsenic	7440-38-2	50
Barium	7440-39-3	1000
Cadmium	7440-43-9	10
Chromium	N/A	50
Lead	7439-92-1	50

b. The Pennsylvania ARAR for groundwater for hazardous substances at the time the ROD was issued was that all groundwater was to be remediated to background" quality as specified by 25 Pa. Code Section 75.264(n).

c. The National Emissions Standards for Hazardous Air Pollutants (NESHAPs) set forth at 40 C.F.R. § 61.63 and promulgated under the Clean Air Act, 42 U.S.C. § 7401 contain an emission standard for vinyl chloride plants which is relevant and appropriate to the air stripping and in situ vapor stripping treatment. The vinyl chloride emission standard is 10 ppm (average for a 3-hour period).

2. Location-Specific ARARs:
No location-specific ARARs with respect to this Site have been identified.

3. Action-Specific ARARs:
a. 25 Pa. Code Sections 123.1 and 123.2 are applicable to the remedial alternative, and require that dusts generated by any earth moving activities be controlled with water or other appropriate dust suppressants.

b. To the extent that new point source air emissions result from the implementation of the remedial alternative, 25 Pa. Code Section 127.12(a)(5) will apply, requiring that emissions be reduced to the minimum obtainable levels through the use of best available technology ("BAT") as defined in 25 Pa. Code Section 121.1.
c. Treatment and discharge of contaminated groundwater to an unnamed tributary of Elk Creek cause the requirements of Pennsylvania's NPDES program to apply. Those requirements, as set forth in 25 Pa. Code Sections 93.1 through 93.8, include permitting, design, discharge, and monitoring requirements which are to be met in implementing the remedial alternative.

d. 25 Pa. Code Sections 102.11 through 102.24 contain relevant and appropriate standards requiring the development, implementation and maintenance of erosion and sedimentation control measures and facilities which effectively minimize accelerated erosion and sedimentation.

e. 25 Pa. Code Sections 105.291 through 105.314, promulgated in part under Pennsylvania's Dam Safety and Encroachments Act of 1978, set forth applicable permitting and design requirements relating to the groundwater treatment discharge pipe/headwall construction.

f. 25 Pa. Code Sections 264(o)(2), (10)-(14) and 264(v)(3)(xxvi)(F)(I), (IV) and (V) contain relevant and appropriate requirements precluding any breaches of the integrity of the existing landfill cap except under certain circumstances, which circumstances are to be met by the remedial alternative. Those provisions also require repair of the landfill cap, as needed.

g. The groundwater treatment and in situ vapor stripping treatment is to be implemented consistent with the requirements of 40 C.F.R. Section 262 (regarding standards applicable to generators) and the substantive requirements for the treatment, storage and disposal of hazardous wastes set forth in 40 C.F.R. Sections 263 (regarding transporters of hazardous wastes) and 264 Subparts B-H (regarding general requirements for TSD facilities).

Since the time the ROD was issued in 1990, the MCL for arsenic has been changed from 50 ppb to 10 ppb. Also, the MCL for lead at the issuance of the ROD was 50 ppb. The drinking water standard for lead has since been revised to an action level of 15 ppb. These changes, however, do not affect the protectiveness of the selected remedy which calls for cleanup of groundwater contaminants to background concentrations. (A number of other MCLs have changed as well, as discussed in Section VII below.)

The human health risk assessment (HHRA) for the Site was conducted using the guidelines established in the Superfund Public Health Evaluation Manual (EPA, October 1986.) Since that time EPA has developed the following guidance documents:

• *Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual, Parts A to E - Interim Final (1989-2004),*

• *Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual - Supplemental Guidance - "Standard Default Exposure Factors" - Interim Final (1991), and*

• *Dermal Exposure Assessment: Principles and Applications (1992).*

These documents provide additional guidance and default values to standardize the methods for conducting HHRAs. There have been no significant revisions in the methodology for HHRAs since the RI was prepared other than the quantitative analysis of the inhalation exposure pathway.

EPA, Region III, Risk-Based Concentrations (RBCs) and Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2) provide benchmarks used to evaluate chemicals of concern (COCs) for direct contact with soil, sediment, surface water and groundwater. In addition, EPA Soil Screening Levels (SSL) and Act 2 include benchmarks for the protection of migration from soil to groundwater and soil to air for pollutant mobility and volatilization from soil to indoor air. Act 2 was promulgated in 1995 after the ROD was issued.

The USEPA Region RBC table was typically updated in the spring and fall of each year to incorporate updated toxicity factors and occasional updates to Superfund risk guidance. In Spring 2008, Region III began to rely for its updates on the Regional Screening table developed by Oak Ridge National Laboratory (ORNL) under an Interagency Agreement with EPA. The benchmarks used to calculate cancer and noncancer risks include EPA's Integrated Risk Information System, EPA's Health Effects Assessment Summary Tables, and EPA's National Center for Exposure Analysis Regional Support Provisional Service. These benchmarks are continually updated as information becomes available. Some of the cancer slope factors and noncancer reference doses may have been changed, withdrawn, or added in these benchmarks.

Therefore, Site risks might be slightly different if the HHRA were conducted at present. Some of the dermal exposure parameters have been changed slightly with the issuance of the 2001 update to EPA dermal exposure guidance; however, the underlying methods for dermal exposure assessment were not changed, and the recommended dermal exposure factors and chemical-specific constants were only slightly altered due to re-evaluation of the same data sources by an EPA workgroup.

The Ecological Risk Assessments (ERAs) are most often conducted by EPA during the Remedial Investigation/ Feasibility Study (RI/FS) phase of the Superfund response process. They are used to evaluate the likelihood of adverse ecological effects occurring as a result of exposure to physical (site cleanup activities) or chemical (releases of hazardous substances) stressors, which are defined as any physical, chemical, or biological entities that can induce adverse responses, at a site. These assessments often contain detailed information regarding the contact or co-occurrence of stressors (or agents) with the biological community at a site. Exposure profiles are developed to identify ecological receptors (tissues, organisms, populations, communities, and ecosystems), habitats, and pathways of exposure. The sources and distribution of stressors in the environment also are characterized. Other information contained in ERAs may include evaluations of individual species, populations of species, general trophic levels, communities, habitat types, ecosystems, or landscapes.

Since the time of the Site's RI and ROD, the ERA process has evolved substantially. In March 1989, the EPA released Risk Management Guidance for Superfund, Volume 2: Environmental Evaluation Manual, which was among the first documents to address ecological risk (EPA540-/1-89/001). In 1992, the EPA published the Framework for Ecological Risk Assessment (EPA/63-R-92/001) as the first statement of principles for ERAs. In April 1998, the Agency published the Guidelines for Ecological Risk Assessment (EPA/630/R-95/002F), which supersedes the 1992 guidance. These documents describe methods for conducting conventional single-species, chemical-based risk assessments, and techniques for assessing risk to ecosystems from multiple exposures (or stressors) and multiple effects (or endpoints) [ECO Update: Ecological Assessment of Superfund Sites: An Overview. EPA 9345.0-05I. Vol. 1, Number 2, December 1991].

In general, most of the changes in the updated documents do not significantly change the overall conclusions of the HHRA. The contaminated waste materials have been isolated in an on- Site landfill that has been capped and fenced. The cap, fencing of the landfill, the fact that none of the contaminated groundwater is being used as a potable water source, and the in place institutional controls have eliminated the exposure

pathways. Land use has not changed since the time of the ROD's issuance and is not expected to change in the near future. There is no current or anticipated future exposure and, therefore, the risks at the Site have been reduced to acceptable levels.

However, exposure to the contaminated materials could occur if the landfill cap at the Site were to be breached in future construction or excavation activities. The construction portion of the remedial action at the Site has been completed with the wastes being capped with a composite cover followed by revegetation. Operation and maintenance activities such as mowing the vegetative cover of the landfill, repairing erosion of the cap, and groundwater sampling are being conducted at the Site.

F. Community Involvement / Interviews

By way of an emails dated September 5, 2008, EPA informed Lord Corporation of the third Five-Year Review.

A public notice informing the public that the EPA was conducting the Five Year Review at the Site appeared in the November 06, 2008 issue of the Erie Times-News newspaper. The notice included a brief overview of the response actions taken at the Site, and the reason that a Five-Year Review is necessary. The notice listed who to contact and how to get additional information related to the Site. In addition, the notice confirmed that the community would be notified upon completion of the Five-Year Review Report.

As part of this third Five Year review, the EPA Community Involvement Coordinator (CIC) for the Site conducted community interviews to determine if the community had any concerns relating to the Site or the protectiveness of the remedy. The CIC spoke with residents of two households living adjacent to the Site and to Lisa Buie, Girard Township's Secretary/Treasurer. Basically, they all gave the CIC the same message -- that the Site has not caused them any concern, nor are they aware of concerns from anyone else. They haven't seen or heard anything unusual at the Site, and the residents are all thankful that their wells are being monitored and they would like the monitoring to continue.

EPA did not receive communications from the area's citizens in response to the November 06, 2008 newspaper notice.

Following signature of this Five-Year Review Report a notice will be sent to a local newspaper announcing that the Five-Year Review Report for the Superfund Site is complete. The results of the review and the report will be made available to the public at the Rice Avenue Community Library, Girard, PA www.riceavenuelibrary.org and the EPA Region III offices in Philadelphia, PA and on the internet at www.epa.gov/arweb.

G. Institutional Controls

For the purposes of the third Five-Year Review, Lord Corporation retained the services of an Erie, Pennsylvania law firm to check the Erie County Office of the Recorder of Deeds to ascertain whether the institutional controls required by the ROD

and the Consent Decree are still in place. The Consent Decree entered into between Lord Corporation and the United States can be found at Book 0180, Page 2091.

By letter dated June 16, 2009, the law firm informed the EPA that the required "Notice Of Obligation" (deed notice) is still in place . The Notice of Obligation is recorded at Book 0180, Page 2263. A copy of the letter to Lord Corporation and a copy of the deed Notice Of Obligation are included as Attachments to this Five-Year Review.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes. The review of Site-related documents, risk assumptions, and the results of the Site Inspection indicates that the constructed remedy is functioning as intended by the ROD. The landfill cap and fencing prevent any potential for direct contact with contaminated soil. The institutional controls have been placed on the deed to the property as verified, in June 2009. Five Year Reviews are being conducted by EPA as indicated in the Site ROD.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes.

Remedial Action Objectives (RAOs)\

There have been no changes in the Site conditions that would affect RAOs or the overall protectiveness of the remedy. The work that has been accomplished has been designed and implemented to meet the RAOs.

Changes in Standards and To Be Considered (TBCs)

There have been no changes in ARARs or TBCs that affect the protectiveness of the remedy. ARARs that must be met include the Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) contained in 40 CFR Parts 141 and 143 and parallel Commonwealth of Pennsylvania requirements with regard to groundwater; and Federal Ambient Water Quality Criteria and parallel Commonwealth of Pennsylvania requirements pertaining to protection of aquatic life in the unnamed tributary of Elk Creek. It is important to note that, even though the ROD lists MCLs as ARARs for groundwater, the cleanup goal, as well as the overriding ARAR specified in the ROD is that groundwater is to be remediated to background contaminant levels. The ARARs identified in the 1990 ROD for this Site are listed above in Section VI.E.

The ARARs which received the most attention during the review process were the MCLs for drinking water contaminants promulgated under the federal Safe Drinking Water Act. The ROD identified MCLs as relevant and appropriate requirements at the Site when considering the hypothetical future use of the groundwater as a potable water

source. Since the issuance of the ROD, EPA has revised the MCL for arsenic from 50 ug/L to 10 ug/L.

The MCL for lead has been replaced by a drinking water action level of 15 ug/L. The MCLs for barium and chromium have both doubled, while the MCL for cadmium has decreased by half since the issuance of the ROD. Additionally, at the ROD issuance, a number of contaminants had proposed MCLs, these proposed MCLs have since been finialized for their respective contaminant. For example the MCL for toulene, has decreased for a proposed 2000 ug/L to final MCl of 1000 ug/L. Changes to the MCLs are summarized in Table 9.

Table 9: Comparison of MCLs listed in ROD to Current MCLs

Contaminant	MCL or [Proposed MCL] At ROD issuance (ug/L)	MCL Current (ug/L)
Benzene	5	5
Chlorobenzene	**[100]**	**100**
Tetrachloroethene	**[5]**	**5**
Toulene	**[2000]**	**1000**
Trans-1,2, dichloroethylene	**[100]**	**100**
Trichloroethene	5	5
Vinyl Chloride	2	2
Arsenic	**50**	**10**
Barium	**1000**	**2000**
Cadmium	**10**	**5**
Chromium	**50**	**100**
Lead	**50**	**15**

These MCL changes are somewhat minimized in importance by the fact that the ultimate cleanup goal required by the ROD is that groundwater is to be remedied to background contaminant concentrations. Site-related contaminants have consistently not been detected in the monitored background well, well W-26A.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics

Land use and zoning on the properties surrounding the Site remain residential and agricultural. Although the primary source of drinking water is groundwater, no wells used for potable water have been affected by Site-related contaminants.

The exposure assumptions used to develop the risk assessment included assumed exposures to contaminated soils and to contaminated water. The assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions or the cleanup levels developed from them is being considered at this time. The ROD clean-up criteria continue to be protective of human health and the environment.

A vapor intrusion exposure pathway evaluation was conducted for the Site during this Five-Year Review. The results of the evaluation indicate the vapor intrusion pathway is not a concern, primarily due to the following: 1) volatile compounds have

never detected in offsite residential wells, 2) the groundwater plume is well defined and cross gradient to existing and/or planned structures, 3) the leading edge of the plume is approximately 500 feet away from the nearest inhabited structure, and 4) no inhabited structures are above the groundwater plume. Given these factors, vapor intrusion pathway is not deemed to be pertinent as such, sampling was not conducted.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. There is no other information that calls into question the protectiveness of the remedy as specified in the ROD

Technical Assessment Summary

According to the data and documents reviewed, the Site inspection, and the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the surrounding land use or the physical conditions of the Site that would affect the protectiveness of the remedy. The only changes to the ARARs identified for the Site in the ROD were the changes noted above. Based on a review of historic groundwater monitoring results, the revised MCLs for site related contaminants and the revised drinking water advisory for lead does not effect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there has been no change to the standardized risk assessment methodology that could affect the protectiveness of the selected remedy. Institutional controls required by the ROD have been placed and remain in effect. There is no other information that calls into question the protectiveness of the selected remedy.

VIII. ISSUES

There are no outstanding issues or concerns related to the Lord-Shope Landfill Site.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for follow-up actions at the Lord-Shope Landfill Site.

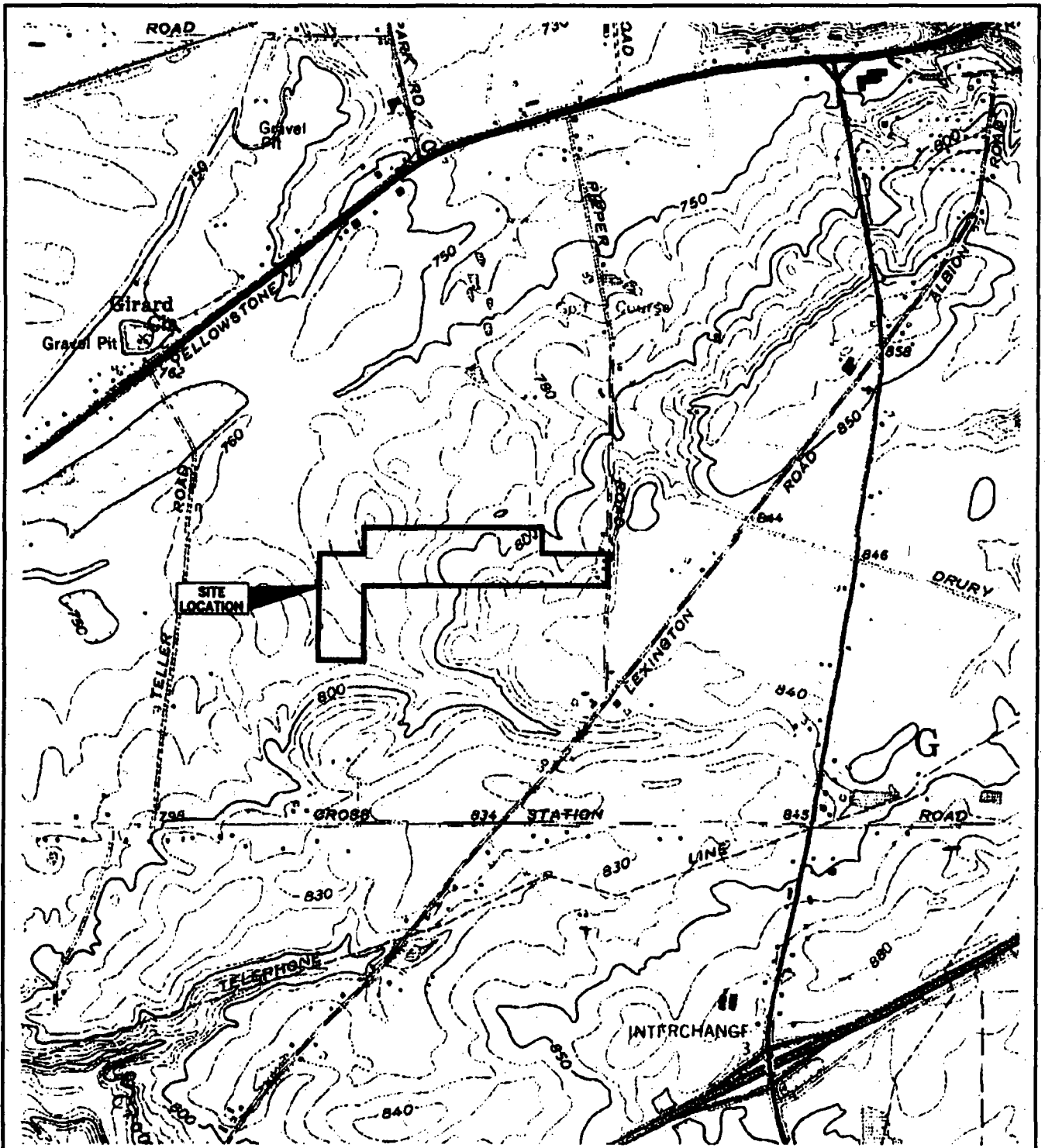
X. Protectiveness Statement

The constructed remedy is functioning as intended by the ROD. The landfill cap and Site fencing provide two lines of defense to prevent any potential for direct contact with contaminated soil. The groundwater extraction system is functioning as designed and the discharge of treated effluent to the unnamed tributary of Elk Creek consistently meets or exceeds NPDES standards. There are no exposures to Site-related groundwater contaminants. The ISVS system is also functioning as designed. The institutional controls are in place and are being maintained on the deed to the property thereby providing an effective warning to any potential future owners of the property regarding the contamination. Because there are no current exposures and because the potential for future exposures is minimal, the remedy at the Site remains protective of human health and the environment.

XI. Next Review

Completion of the next Five-Year Review for the Lord-Shope Landfill Superfund Site is required five years from the signature date of this Five-Year Review.

Figures



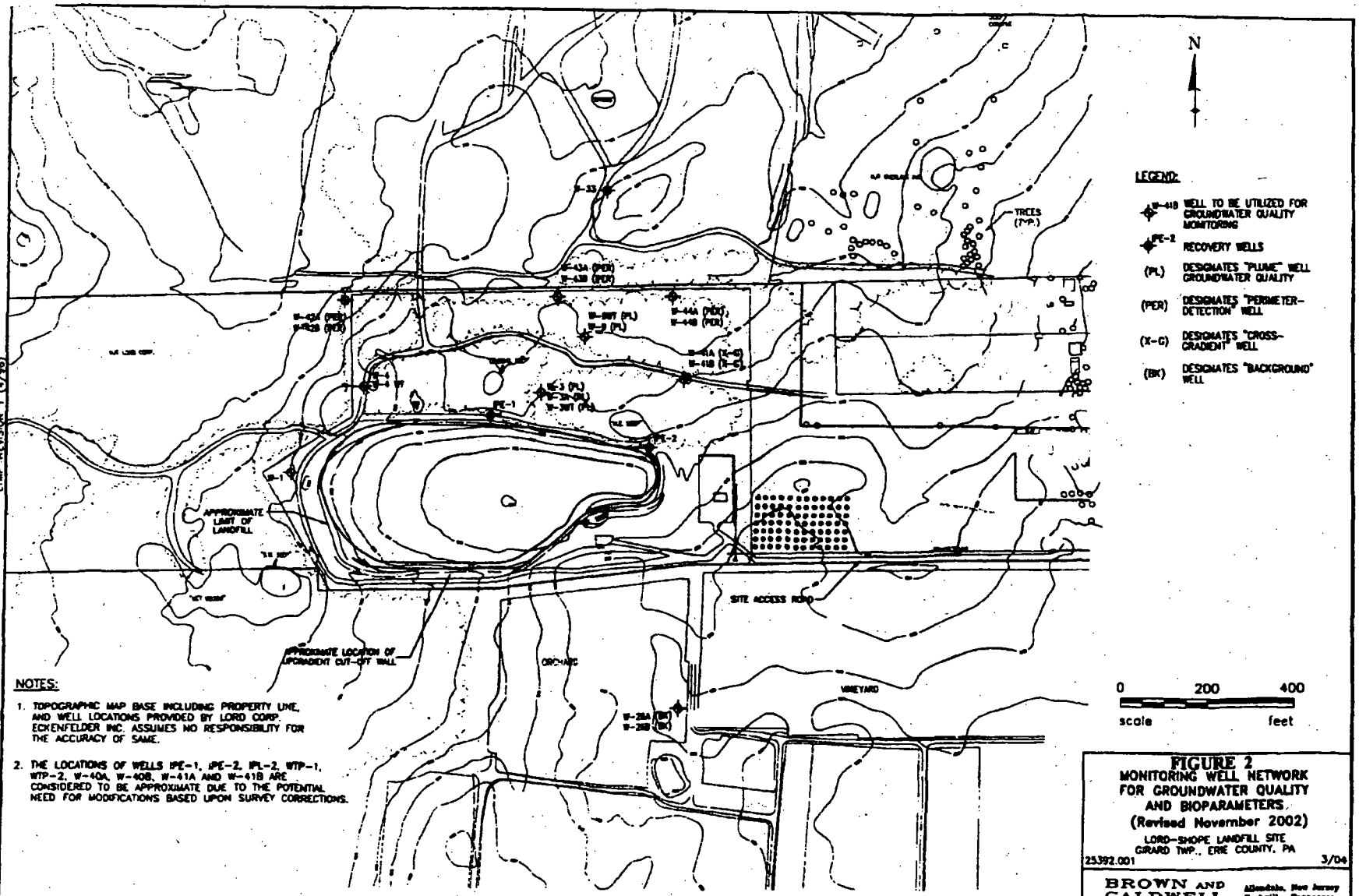
SECTION OF: U.S. GEOLOGICAL SURVEY. ALBION QUADRANGLE, PENNSYLVANIA 1:24,000 7.5 MINUTE SERIES. WASHINGTON D.C., USGS, 1988; PHOTOREVISED 1990.

LORD CORPORATION
ERIE, PENNSYLVANIA
OH000933.2006

SITE LOCATION MAP
LORD SHOPE LANDFILL SITE
GIRARD TOWNSHIP, PENNSYLVANIA

ARCADIS

FIGURE 1



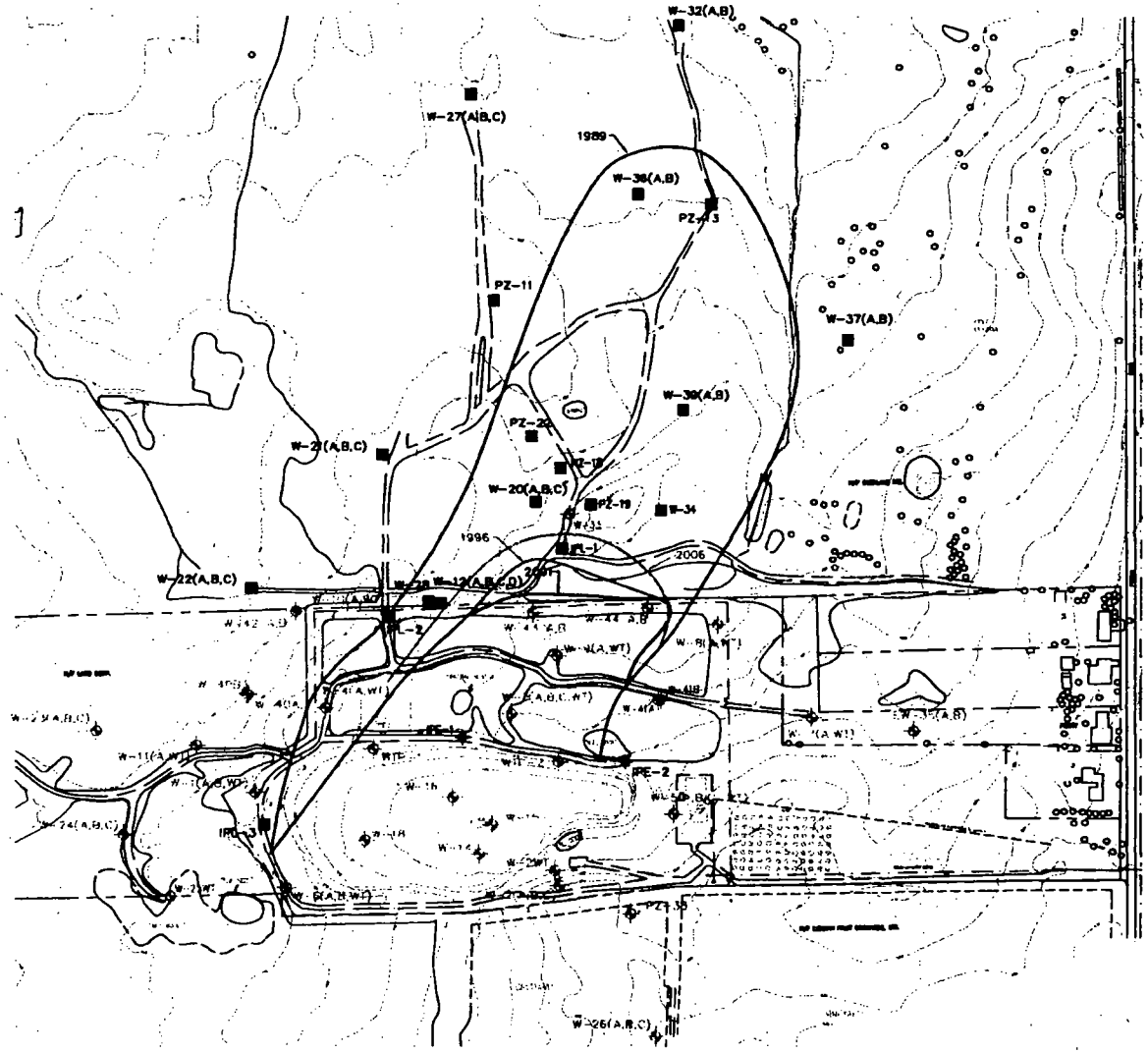
NOTES:

1. TOPOGRAPHIC MAP BASE INCLUDING PROPERTY LINE, AND WELL LOCATIONS PROVIDED BY LORD CORP. ECKENFELDER INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF SAME.
2. THE LOCATIONS OF WELLS IPE-1, IPE-2, IPL-2, WTP-1, WTP-2, W-40A, W-40B, W-41A AND W-41B ARE CONSIDERED TO BE APPROXIMATE DUE TO THE POTENTIAL NEED FOR MODIFICATIONS BASED UPON SURVEY CORRECTIONS.

FIGURE 2
MONITORING WELL NETWORK FOR GROUNDWATER QUALITY AND BIOPARAMETERS.
(Revised November 2002)
LORD-SHOPE LANDFILL SITE
GIRARD TWP., ERIE COUNTY, PA
25392.001 3/04

BROWN AND CALDWELL Allendale, New Jersey Nashville, Tennessee

DRAWING NO. 25392-08 DATE: 3/22/04 PLOT SCALE 1=2400 LTMP REVISION 1 (4/95)



N

0 200 400

scale feet

NOTES:

1. TOPOGRAPHIC MAP PREPARED PHOTOGRAMMETRICALLY BY AEROCON PHOTOGRAMMETRIC SURVEYS, INC. FROM AERIAL PHOTOGRAPHY (3/31/88).
2. APPROXIMATE PROPERTY LINE ALIGNMENT BASED UPON SURVEYS CONDUCTED BY WRESLOGEL-BILLE ASSOCIATES (11/22/81) AND BY URBAN ENGINEERS, INC. (10/22/86). ADDITIONS TO LORD PROPERTY SURVEYED BY HENRY T. WELKA, AS SHOWN ON CAD DRAWING PROVIDED BY LORD CORP. (ADAPTED FROM BROWN AND CALDWELL FIGURE 1-4)
3. THE APPROXIMATE PLUME EXTENT (WATER TABLE AND INTERMEDIATE ZONES COMBINED) IS BASED ON ANNUAL RESULTS FOR TOTAL HALOGENATED VOCs (>5ug/L).

LEGEND:

- MONITOR WELL
- GROUNDWATER RECOVERY WELL
- DECOMMISSIONED WELL/PIEZOMETER
- LAND SURFACE ELEVATION CONTOUR
- STRUCTURES
- ROAD
- FENCE AND/OR PROPERTY LINE
- APPROXIMATE PLUME EXTENT IN 1989 (SEE NOTE 3)
- APPROXIMATE PLUME EXTENT IN 1996 (SEE NOTE 3)
- APPROXIMATE PLUME EXTENT IN 2001 (SEE NOTE 3)
- APPROXIMATE PLUME EXTENT IN 2006 (SEE NOTE 3)

LORD CORPORATION
ERIE, PENNSYLVANIA
OH000633.2008

HISTORICAL CHANGES IN VOC PLUME (WATER TABLE AND INTERMEDIATE ZONE) LORD SHOPE LANDFILL SITE

ARCADIS

FIGURE 3

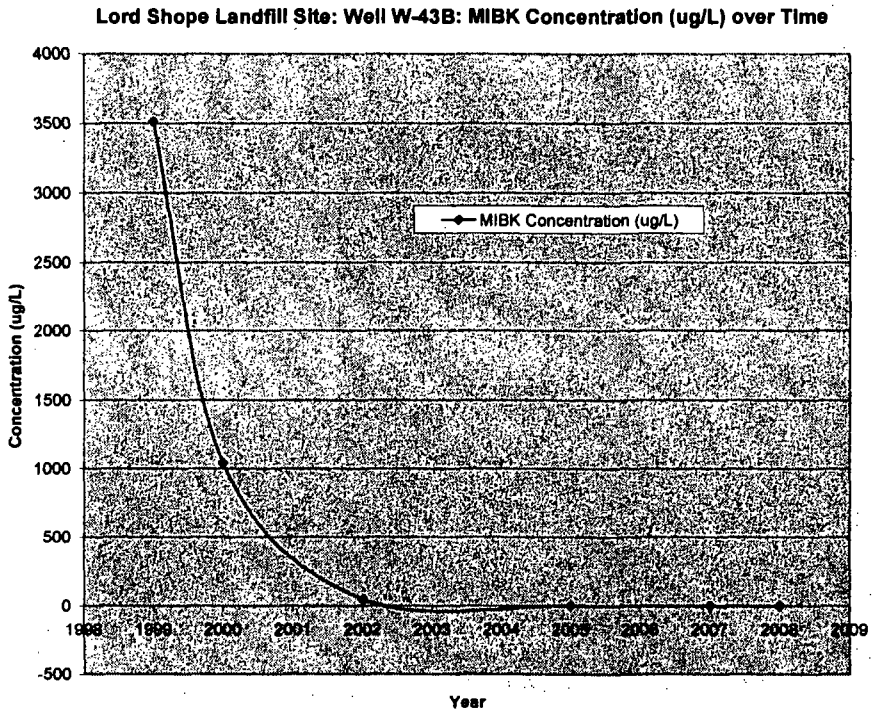


Figure A-1: Lord Shope Landfill Site Well W-43B MIBK Concentration over Time

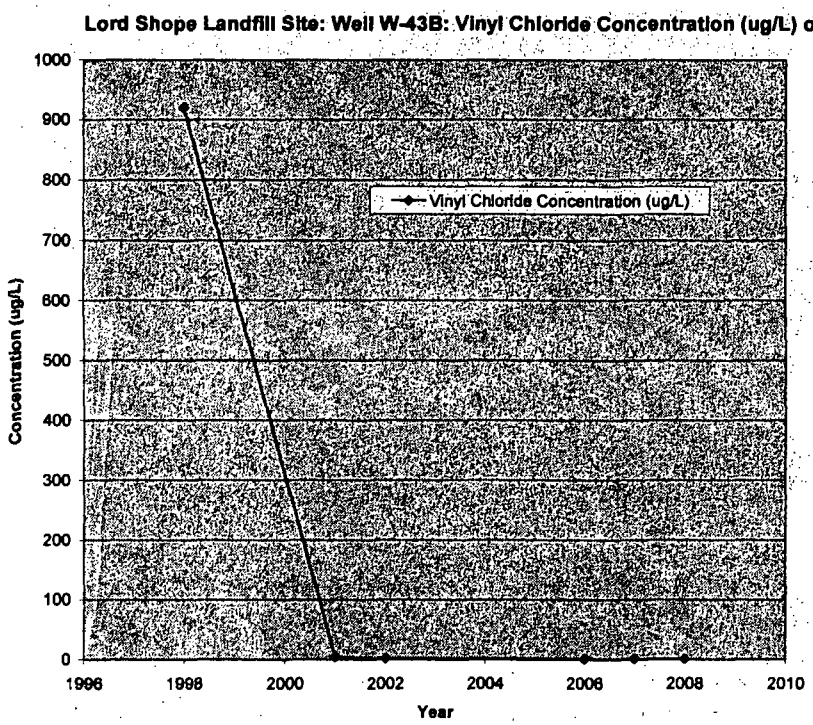


Figure A-2: Lord Shope Landfill Site Well W-43B Vinyl Chloride Concentration over Time

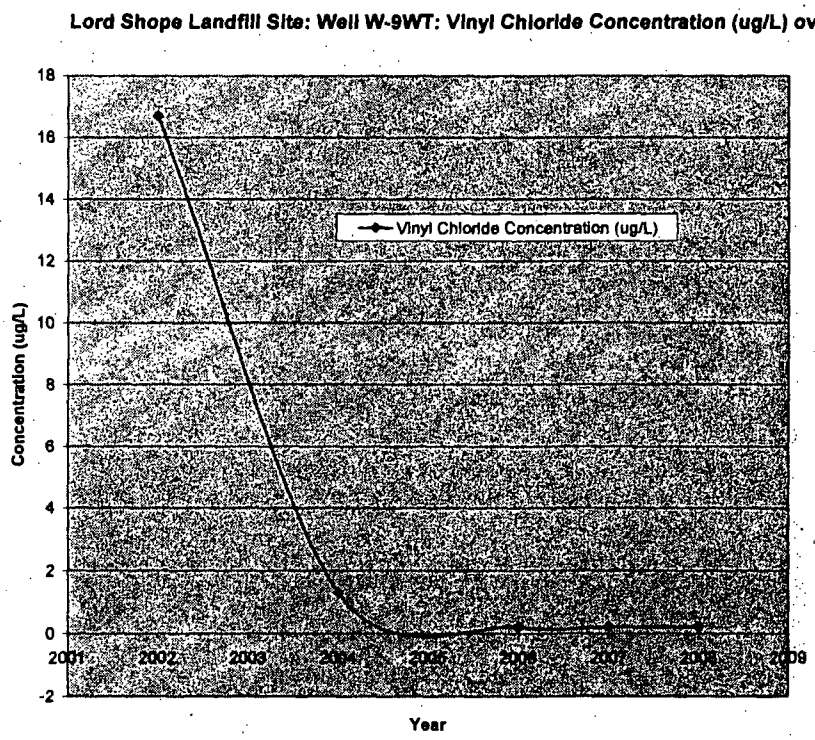


Figure A-3: Lord Shope Landfill Site Well W-9WT Vinyl Chloride Concentration over Time

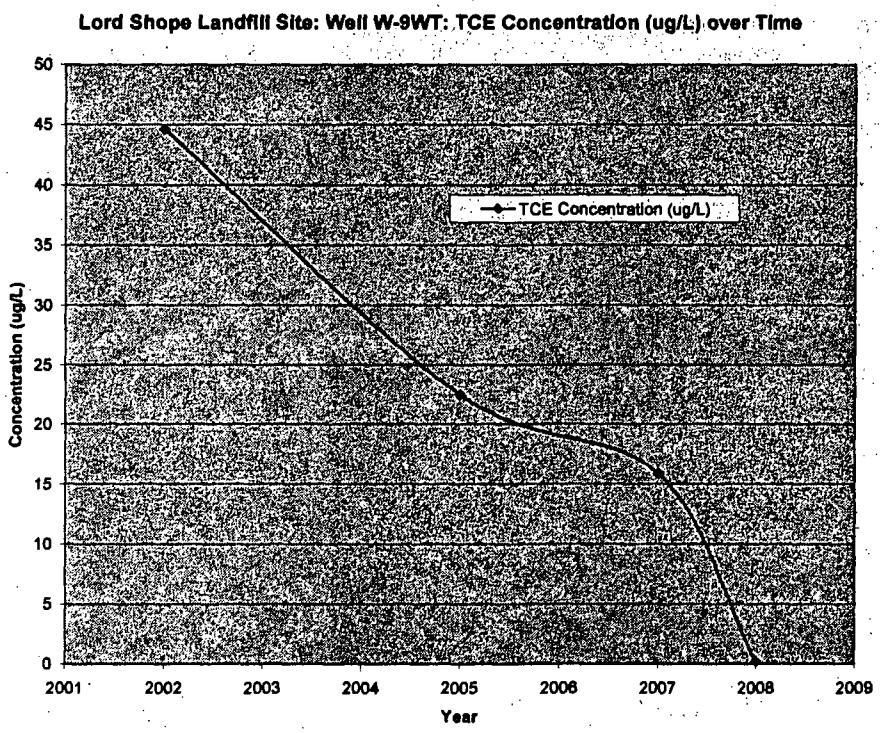


Figure A-4: Lord Shope Landfill Site Well W-9WT TCE Concentration over Time

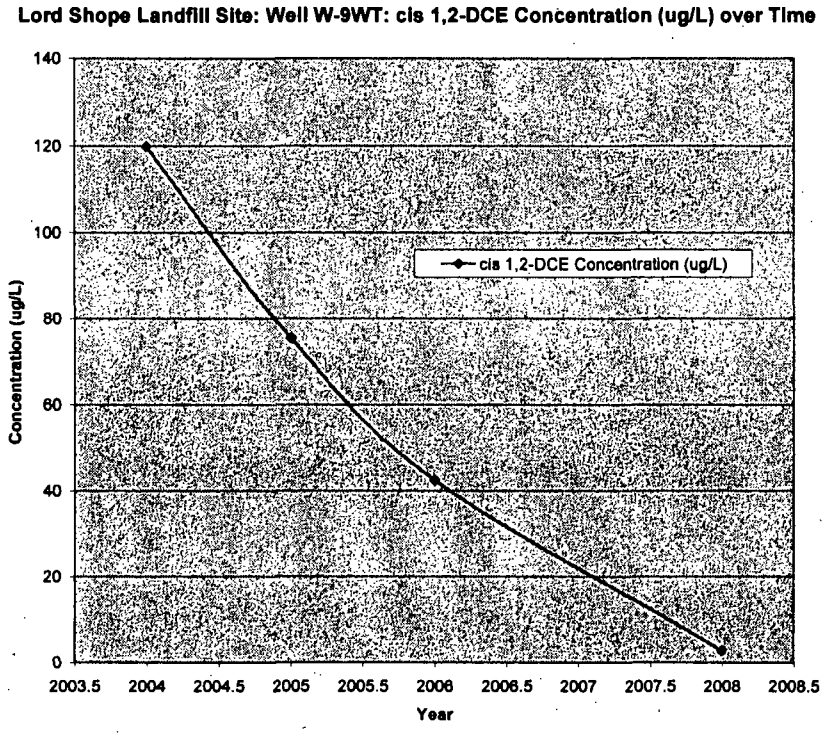


Figure A-5: Lord Shope Landfill Site Well W-9WT cis1,2-DCE Concentration over Time

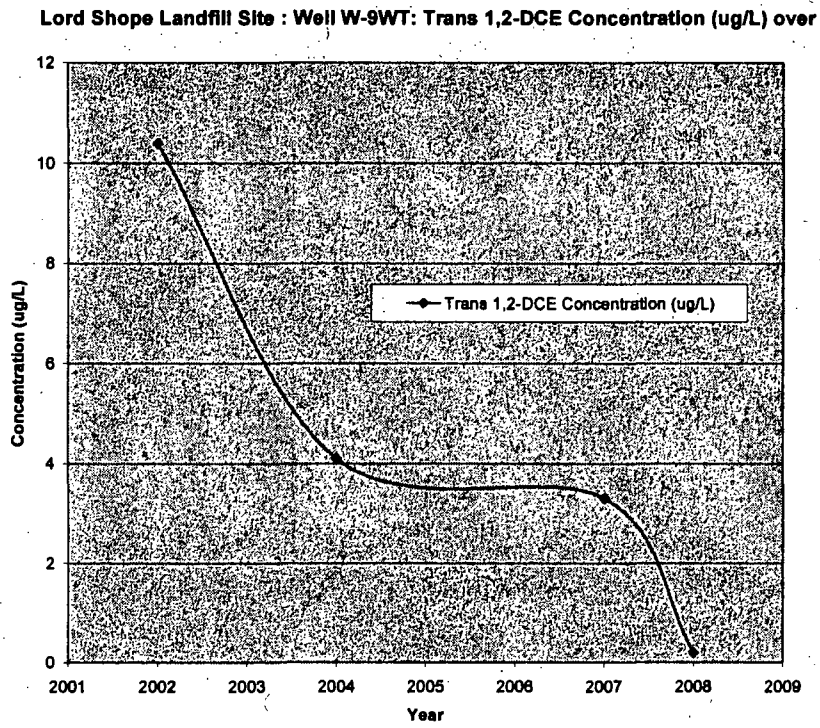


Figure A-6: Lord Shope Landfill Site Well W-9WT trans1,2-DCE Concentration over Time

Attachments

MACDONALD
ILLIG ATTORNEYS

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MARK J. SHAW, ESQ.
ADMITTED IN PA AND OH
DIRECT DIAL 814-870-7607
E-MAIL MSHAW@MIJB.COM

June 16, 2009

Mr. David P. Turner
Superfund Remedial Project Manager
USEPA - Region III
Western Pennsylvania/Maryland Remedial Branch
1650 Arch Street - Mail Code 3HS22
Philadelphia, PA 19103

Re: USEPA Five-Year Review
Lord Shope Landfill - Institutional Controls

Dear Mr. Turner:

We have been asked by Lord Corporation, as part of USEPA's Five-Year Review of the Shope Superfund Site, to confirm that the institutional controls (deed notices) were still in place for the Site. The institutional controls identified were the Notice of Obligation dated October 17, 1991 (Book 0180, page 2263) and the Consent Decree (Book 0180, page 2091).

Please be advised that a search of the records at the Erie County Recorder of Deeds revealed that the institutional controls from the Lord Shope Superfund Site remain in place.

Please advise if you need anything further.

Thank you for your assistance.

Very truly yours,

MacDONALD, ILLIG, JONES & BRITTON LLP

By _____
Mark J. Shaw

MJS/tmb/1136815
cc: Lord Corporation

RECORDER OF DEEDS

'91 OCT 17 P 1:03

BK0180 PG2263

COMMONWEALTH OF PENNSYLVANIA)
) NOTICE OF OBLIGATION
COUNTY OF ERIE)

THIS NOTICE OF OBLIGATION is made and effective this 16th day of October, 1991, by Lord Corporation, a Pennsylvania Corporation, with its principal place of business located at 2000 West Grandview Boulevard, Erie, PA 16514-0038;

WITNESSETH THAT:

In accordance with the terms of Section V. E. of the Consent Decree between the United States of America and Lord Corporation entered in the United States District Court For The Western District of Pennsylvania (Civil Action No. 91-117E) on September 27, 1991, a certified copy of which is recorded in the Office of the Recorder of Deeds of Erie County, Pennsylvania at Deed Book No. 180, Page No. 2091, Lord Corporation does hereby advise any and all persons and entities, including any grantee or other successor-in-title, of the responsibilities and obligations, under the Consent Decree, of Lord Corporation and/or such grantees or successors-in-title in and to the following parcels of property owned by Lord Corporation as of this date:

All those pieces and parcels of land situated in the Township of Girard, County of Erie and Commonwealth of Pennsylvania, located at or adjacent to property known as 6262 Pieper Road, Girard Township, PA, a portion of which properties is also known as the Lord-Shope Superfund Site, which have been conveyed to Lord Corporation on the following dates and by the following persons:

Melvin L. Shope and Meryl A. Shope, his wife, by Deed, dated June 6, 1983, recorded in the Office of the Recorder of Deeds of Erie County, PA on June 24, 1983 at Deed Book No. 1499, Page No. 95;

Clyde Perry and Alma Pearl Perry, his wife, by Deed, dated June 12, 1986, recorded in the Office of the Recorder of Deeds of Erie County, PA on June 17, 1986 at Deed Book No. 1633, Page 598; and

Estate of Meryl A. Shope (Virginia L. Platz, Executrix), by Deed dated July 15, 1991, recorded in the Office of the Recorder of Deeds of Erie County, PA on July 17, 1991 at Record Book No. 169, Page 31.

Pursuant to the terms of the Consent Decree, the following covenants shall apply to and shall run with the parcels of land identified above, as well as any other properties located adjacent or contiguous to the parcels identified above which are subsequently acquired or controlled by Lord Corporation, and shall be binding upon Lord Corporation and any and all grantees or successors-in-title to all or part of the properties identified above:

[redacted]

1. The United States of America and its representatives shall have access at all reasonable times to the property for purposes of effectuating and monitoring compliance with the terms of the Consent Decree, all as provided in Section X (Access) of the Consent Decree;

2. No grantee or successor-in-title shall interfere with, obstruct or disturb the performance, support or supervision of any remedial or response actions taken or to be taken on the property, including any operation and maintenance activities conducted in connection with the terms of the Consent Decree;

3. The grantee or successor-in-title shall inform any person or entity that subsequently acquires any title, easement, leasehold or other interest in the property or any portion thereof of the requirements, conditions and operative effect of Section X (Access) of the Consent Decree.

IN WITNESS WHEREOF, Lord Corporation has caused this Notice of Obligation to be executed by its duly authorized representative, as of the day and date first above written.

LORD CORPORATION

James W. Wright

James W. Wright
Vice President, Legal Affairs
and Secretary

STATE OF PENNSYLVANIA)
)
COUNTY OF ERIE)

On this the 16th day of October, 1991, before me appeared James W. Wright, known to me, and acknowledged the foregoing instrument to be his free act and deed, being authorized to do so, as Vice President of Lord Corporation, a Pennsylvania corporation.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Mary L. Winschel
Notary Public

NOTARIAL SEAL
MARY L. WINSCHEL, NOTARY PUBLIC
ERIE, ERIE COUNTY, PENNSYLVANIA
MY COMMISSION EXPIRES JUNE 28, 1995

David B. Wilson
CLERK OF RECORDS
ERIE, CO. PA.